Net Works for Malaria Control

In just a couple days, Youyou Tu, William C. Campbell and Satoshi Ōmura will meet His Majesty King Carl XVI Gustaf of Sweden to receive the Nobel Prize in Physiology or Medicine. Tu's discovery of artemisinin, a potent anti-malarial. and Campbell and Ōmura's work on ivermectin, a broad-spectrum antiparasitic drug, has helped to mitigate the burden of parasitic diseases, especially in the developing world. Despite all effort and advances, stopping the spread of preventable parasitic diseases remains an unmet goal. Bhatt et al. (Bhatt et al., 2015) now present the first data-driven comprehensive picture of how specific interventions for malaria control have impacted the spread of this disease in the past 15 years.

A demonstration of how to set up a mosquito bed net. Image courtesy of Andre Roussel, USAID.

In 1978, every 6 seconds one child would die from malaria. Today, one child still dies from malaria every minute. Malaria is a burden of approximately 600,000 deaths every year, concentrated largely in sub-Saharan Africa (Hemingway, 2015). First line treatment with the drug chloroquine and control of the exposure to the insect that transmits the disease with indoor spraying of the insecticide DDT failed, mostly due to acquisition of resistance by the Plasmodium—the malaria parasite, and the anopheline mosquitoes, the malaria vector.

The critical turning point in the combat against the disease was the launch of the Roll Back Malaria Initiative and the wider development agenda around the United Nations Millennium Development Goals, kicked off in the year 2000. The ambitious agenda: begin to reverse malaria incidence and to halt malaria spread by 2015. Since then, funding for malaria control has increased 20×, split between access to insecticide-treated bed nets, indoor residual spraying—actions to reduce exposure to the mosquitoes—prompt treatment of clinical malaria cases, and substitution of old drugs for highly efficacious artemisinin-based combination therapy.

Now that the benchmark year of 2015 has been reached, Bhatt et al. attempt to quantify the prevalence of *Plasmodium falciparum* infection and disease incidence across sub-Saharan Africa from 2000 to 2015, as well as to define the role major interventions have had in causing changes in malaria endemicity. By modeling disease transmission, the authors were able to generate counterfactual geospatial maps that provide estimation of what malaria parasite prevalence rates would look like today without each intervention. In total, they estimate that 663 million clinical cases of malaria were averted between 2000 and 2015. The distribution of bed nets alone was responsible for 68% percent of this improvement, followed by 22% resulting from artemisinin-based combination therapy, and 10% from indoor residual spraying. There are caveats to these numbers. For instance, they vary to some extent within different territories, and they are affected by how early and the scale that each intervention was deployed. Nonetheless, it may come as a surprise that such large fraction of the improvement can be attributed to interventions focused on mosquito-control.

Although the incidence of malaria has decreased to half of what it used to be 15 years ago, the new data suggest caution. Millions of people are still at risk of malaria disease and death in Africa, and rates of improvement slowed down about 5% per year in 2013. Continued distribution of bed nets, replacement of the old ones, surveillance for arousal of parasite and mosquito resistance—already documented in other areas in the world—will be essential steps to reduce the number of disease cases.

The World Health Organization and the Roll Back Malaria Partnership now have moved onto defining goals and priority actions for malaria control in the next 15 years period. Beyond providing an accurate picture of the effectiveness of malaria interventions in the recent past, the new data will be crucial to inform policy agencies with an optimal strategy for the future.

REFERENCES

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João Monteiro